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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/034,340	12/27/2001	Michael D. Ruehle	10559-635001/P12330	8398

20985 7590 05/31/2006

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EXAMINER	
JAGANNATHAN, MELANIE	

ART UNIT	PAPER NUMBER
2616	

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/034,340	RUEHLE, MICHAEL D.	
	Examiner	Art Unit	
	Melanie Jagannathan	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13,15-24,26-28,30 and 31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *28* is/are allowed.

6)☒ Claim(s) *1-13,15-24,26,27,30 and 31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

- Examiner has considered Amendment after Non-Final filed 3/06/2006.
- Claims 1-13, 15-24, 26-28, 30-31 are pending.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-9, 10-13, 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Posner et al. US 4,807,280 in view of Kato et al. US 5,532,855.

Regarding claims 1,6-9, the claimed determining integer factors of N, in which represents the number of signals to be permuted is disclosed by Posner et al. by N input lines and to construct a cross-connect switch, the largest prime factor of N, N_c, is

determined and is number of input and output lines for center stage switch module. Furthermore, N/ N_c is decomposed into its prime factors to determine number of stages. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. The claimed selecting a configuration for layers of a permuting network based on the integer factors of N and one or more pre-selected type of switches and constructing the permuting network in layers by using the one or more pre-selected types of switches based on selected configuration is disclosed by Posner et al. by N input lines and to construct a cross-connect switch, the largest prime factor of N, N_c, is determined and is number of input and output lines for center stage switch module. Furthermore, N/ N_c is decomposed into its prime factors, f_i, to determine number of stages. If there are S prime factors, the cross-connect switch will have 2S+1 stages. The cross-connect switch will be symmetric about center stage switch module with f_i X f_i switch modules. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. Examiner interprets the pre-selected types of switches to be that a formula is predetermined for modules and according to N, a particular cross-connect switch will have to be construct according to these "pre-selected" formulas.

Posner et al. does disclose multi-dimensional switch with stages and a plurality of switch modules in each stage. Posner et al. does not explicitly disclose the claimed assigning multi-dimensional coordinates to the switches, each switch having a coordinate that is the same as another switch in the next layer, and coordinates of two switches differ in at most one dimension. Figure 6 of Instant specification refers to each layer in switch having the coordinate [1,1,1].

Kato et al. discloses optical space switch device with four stages with 2x2 optical switches (Figures 11a-11d), a switch in each stage having a (0,0) coordinate. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify Posner et al. multi-dimensional switch with coordinates of Kato et al. to use to determine between channels transmitted through optical space switch.

Regarding claims 2-3, the claimed each of the types of switches is capable of selecting one signal from among a number of signals, the number being different for different types of switches and the claimed integer factors corresponds to number of signals that one type of switches can select from is disclosed by switches (Figure 3, element 101) in first stage select from two signals, switches in second stage (element 102) select from two signals, switches in third stage (element 103) selects from three signals, switches in fourth stage (element 104) select from 6 signals, and switches in fifth stage (element 105) select from three signals.

Regarding claim 4, the claimed selecting set of integer factors w1, w2,...,wD such that N= w1xw2x...xwD is disclosed by example where if N=36, factors are 6 x 3 x 2. See column 6, lines 20-34.

Regarding claim 5, the claimed 2D-1 layers of switches, including w1:1, w2:1,..., and wD:1 switches is disclosed by D=3 and there are 5 stages in cross-connect switch with 2X2, 3X3 and 6X6 switches. See column 6, lines 20-34.

Regarding claim 10, the claimed selecting set of integer factors w1, w2,...,wD such that N= w1xw2x...xwD is disclosed by example where if N=36, factors are 6 x 3 x 2. The claimed 2D-1 layers of switches, including w1:1, w2:1,..., and wD:1 switches is

disclosed by D=3 and there are 5 stages in cross-connect switch with 2X2, 3X3 and 6X6 switches. See column 6, lines 20-34.

Regarding claims 11, 13, the claimed N input and output terminals, N being an integer, N= w1xw2x...xwD, the claimed permuting network that connects input terminals to output terminals constructed from layers of switches that include w1:1, w2:1,...wD:1 switches is disclosed by N input and output lines and to construct a cross-connect switch, the largest prime factor of N, N_c, is determined and is number of input and output lines for center stage switch module. Furthermore, N/ N_c is decomposed into its prime factors to determine number of stages. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. If there are S prime factors, the cross-connect switch will have 2S+1 stages. The cross-connect switch will be symmetric about center stage switch module with f_i X f_i switch modules. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. Examiner interprets the pre-selected types of switches to be that a formula is predetermined for modules and according to N, a particular cross-connect switch will have to be construct according to these "pre-selected" formulas.

Posner et al. does disclose multi-dimensional switch with stages and a plurality of switch modules in each stage. Posner et al. does not explicitly disclose the claimed assigning multi-dimensional coordinates to the switches, each switch having a coordinate that is the same as another switch in the next layer, and coordinates of two switches differ in at most one dimension. Figure 6 of Instant specification refers to each layer in switch having the coordinate [1,1,1].

Kato et al. discloses optical space switch device with four stages with 2x2 optical switches (Figures 11a-11d), a switch in each stage having a (0,0) coordinate. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify Posner et al. multi-dimensional switch with coordinates of Kato et al. to use to determine between channels transmitted through optical space switch.

Regarding claim 12, the claimed each switch has input and output terminals, input terminals of switches in first layer coupled to N input terminals and output terminals of switches in last layer coupled to N output layers, and for all layers except last layer, the output terminals of switches are connected to input terminals of switches of next layer is disclosed by cross-connect switch of Figure 3 where there are 36 input lines to first stage, 36 output lines in last stage and inputs and outputs are connected in middle stages.

Regarding claim 15, the claimed 2D-1 layers of switches, each layer permuting the order of subsets of signal paths is disclosed by D=3 and there are 5 stages in cross-connect switch with 2X2, 3X3 and 6X6 switches permuting the original 36 input lines. See column 6, lines 20-34.

Regarding claim 16, the claimed p-th layer of switches, p ranging from 1 to D, wp:1 switches are configured to form wp-by-wp permuters that are capable of permuting the ordering of wp signal paths is disclosed by D=3 and 1st to 3rd stages of cross connect containing 2x2, 3x3, 6x6 switches to permute the order of signals selected from previous stages. The claimed q-th layer of switches, q ranging from D+1 to 2D-1, w2D-q :1 switches are configured to form w2D-q -by- w2D-q permuters that are capable of

permuting the ordering of signal paths is 3x3 and 2x2 switches in fourth and fifth stages. See Figure 3 and column 6, lines 1-34.

Regarding claim 17, the claimed input terminals of each permuter in 2nd layer to (2D-1)th layer is connected to output terminal of a different permuter in previous layer is disclosed by 2nd stage 3x3 switches connected 6x6 switches connected to 3x3 switches connected to 2x2 switches. See Figure 3.

2. Claims 18-19, 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Posner et al. US 4,807,280.

Regarding claims 18-19, 22-23, the claimed N input and output terminals, N being an integer, N= w1xw2x...xwD, the claimed permuting network that connects input terminals to output terminals constructed from layers of switches that include w1:1, w2:1,...wD:1 switches is disclosed by N input and output lines and to construct a cross-connect switch, the largest prime factor of N, N_c, is determined and is number of input and output lines for center stage switch module. Furthermore, N/ N_c is decomposed into its prime factors to determine number of stages. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. If there are S prime factors, the cross-connect switch will have 2S+1 stages. The cross-connect switch will be symmetric about center stage switch module with f_i X f_i switch modules. See column 5, lines 55-57, lines 66-68, column 6, lines 1-34. Examiner interprets the pre-selected types of switches to be that

a formula is predetermined for modules and according to N, a particular cross-connect switch will have to be construct according to these "pre-selected" formulas.

Posner et al. discloses all of the limitations of the claims except for each layer has N switches of same type. At the time it would have been obvious to modify Posner to have N switches in all 5 stages of cross connect matrix disclosed in Figure 3. One of ordinary skill in the art would be motivated to do so to permute each input line in each switch of next stage.

3. Claims 20-21, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Posner et al. in view of Larson et al. US 4,833,468

Posner et al. discloses all of the limitations except for first device being computer motherboard and second device being memory, permuting network being field programmable gate array. Larson et al. discloses switch chip, processor and memory (Figures 6 and 7). See column 11, lines 19-24. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify Posner et al. with chips, processor and memory of Larson for efficient data fetching from memory.

4. Claims 24,26,27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Posner et al. in view of Kato et al. in further view of Beshai US 6,853,635.

Regarding claims 24, 26-27, 30, Posner et al. disclose a computer program stored on computer-readable media for causing computer system to perform steps. Posner et al. disclose the switch points are controlled by computer which receives

instructions specifying the desired connections. See column 4, lines 62-67, column 5, lines 1-3.

Posner et al. does not explicitly disclose the claimed for each operation, each signal prior to operation has a coordinate that is the same as another signal after the operation. Figure 6 of Instant specification refers to each layer in switch having the coordinate [1,1,1].

Kato et al. discloses optical space switch device with four stages with 2x2 optical switches (Figures 11a-11d), a switch in each stage having a (0,0) coordinate. At the time the invention was made it would have been obvious to a person of ordinary skill in the art to modify Posner et al. multi-dimensional switch with coordinates of Kato et al. to use to determine between channels transmitted through optical space switch.

Posner et al. and Kato et al. disclose all of the limitations except for computer-readable media for assigning D-dimensional coordinate to each set of N signals, in successive operations, changing coordinates of N signals for particular dimension during each operation, such that after successive operations, the coordinates of N signals match a set of target coordinates. Beshai discloses N-dimensional lattice network with plurality of edge modules identified by N coordinates for addressing. Route-sets are computed for edge modules by permuting coordinates of edge modules. See column 2, 52-67, column 3, lines 1-42. At the time the invention was made, it would have been obvious to implement steps of coordinate permutation of Beshai into program code for use by Posner et al. One of ordinary skill in the art would be motivated to do so for efficiency of automated system.

Allowable Subject Matter

5. Claim 28 is allowed.

The following is a statement of reasons for the indication of allowable subject matter: Prior art of record does not disclose, in single or in combination, p-th layer switches configured to swap signals that differ only in the p-th coordinates with coordinates in other dimensions being the same, p ranging from 1 to D, and q-th layer switches configured to swap signals that differ only in the (2D-q)-th coordinates with the coordinates in other dimensions being the same, q ranging from D+1 to 2D-1 in combination with other limitations of the claim.

Response to Arguments

6. Applicant's arguments filed 3/6/2006 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie Jagannathan whose telephone number is 571-272-3163. The examiner can normally be reached on Monday-Friday from 8:00 a.m.-4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi Pham can be reached on 571-272-3179. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJ
5/24/06

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